

OSVRT NA VERIFIKACIJU ROBE I OCJENU DOBAVLJAČA

A REVIEW OF THE VERIFICATION OF GOODS AND SUPPLIER EVALUATION

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Prethodno priopćenje

Sažetak: Rezultati ulazne kontrole osnova su za donošenje odluke treba li pojedine proizvode ili materijal prihvatiti ili reklamirati i kako se to odražava na proizvodni proces. Uzorkovanje kod ulazne kontrole važan je čimbenik kvalitete. Ukazuje se na neke tipične postupke uzorkovanja, prema atributnim i mjernim karakteristikama te na ciklus primjene uzorkovanja kod ulazne kontrole. Posebno se pojašnjava smisao izbora i ocjene dobavljača s aspekta smanjenja troškova ulazne kontrole. U tom smislu za potrebe ovog članka posebno je razvijana jedna od mogućih metoda za ocjenu dobavljača.

Ključne riječi: faze kontrole, planovi uzorkovanja, uzorkovanje, verifikacija, ulazna kontrola, izbor i ocjena dobavljača

Preliminary communication

Abstract: The results of intake control are the basis for making decisions about whether to accept or reject a particular product or material, and how this affects the manufacturing process. An important quality factor in the intake control is sampling. This paper indicates some typical sampling procedures according to the attribute and measuring characteristics, and the cycle of sampling application in the intake control. The significance of selecting and evaluating a supplier is clarified in particular, in terms of intake control cost reduction. Thus, for the purpose of this article, one of the possible methods of evaluating suppliers has been specifically developed.

Key words: control phases, sampling plans, sampling, verification, intake control, selecting and evaluating suppliers

1. INTRODUCTION

How much control is required as products and materials enter a company was known a long time ago by quality assurance experts H. F. Dodge and H. G. Romig: "The answer should always be reached through economics, i.e. the percentage of goods being controlled should be such that the objective is achieved." It is obvious that it is all about the selection between a 100% control, procedures without any control or something between these extremes, i.e. sampling.

The dependence on 100% control is usually expensive, and sometimes completely inefficient. Its application may result in self-content of controllers and motivation reduction, as well as encourage constant criteria for receiving goods. A true alternative is represented by selecting the non-control option.

A sampling measure is located between these two extremes and represents the optimal option regarding the cost-effectiveness and resource consumption. Sampling is usually used when the degree of deviation from product or process specifications is unknown. Unfortunately, this is the most common case when there are no comprehensive quality data.

The term "control" in quality assurance systems is defined as "the activity or the fact of controlling", and it implies "the strength or expertise for guidance or management". Sampling at data receipt has often been

observed as a passive quality element of separating the good and the bad. In this sense sampling is used at the receipt control when a single product batch is individually controlled. However, when sampling is applied to constant inflow of products or materials, it enriches the quality assurance system of a production process. Plans, schedules and the system that are related to sampling may be used within the intake control strategy in order to achieve better quality at a lower price, to increase the productivity and to improve process control in general.

2. THE SIGNIFICANCE OF INTAKE CONTROL

The purpose of intake control or goods verification by the supplier is to protect the consumer from the delivery of unacceptable quantity and quality of products and materials. Quality variation and control strictness at intake control directly depend on the significance of controlled characteristics and it is reversely proportional to the level of good quality determined by this very control.

A small amount of quality control is contained in the application of sampling plans to a single product batch. However, when it is applied within the intake control system, the plan becomes means of:

- consumer protection

- manufacturer protection
- quality data collection
- cost reduction
- upgrading production and other processes

Generally it may be said that there are two procedures of goods sampling by the supplier:

- sampling procedure according to attributes
- sampling procedure according to variables

The objective of both procedures refers to:

- guarantee of a certain price for the consumer and the manufacturer
- maintaining the quality level or correcting its level
- guarantee of an average quality control
- reducing the scope of control upon evidence and experience of good quality
- determining compliance with specifications and orders.

Many procedures and norms in the sampling and intake system are known. The selection of a sampling procedure depends on the scope and nature of product quality data, i.e. data and experience with a concrete supplier. [6].

The essence of verifying goods received by the supplier is to compare what entered the company with what was ordered or agreed on with the supplier. In this sense we differ between quantitative and qualitative control. A deviation from the quantity or quality constitutes non-compliance that frequently requires a quick solution. These are undesired situations that create problems for the manufacturer as well as disturbances in production processes [4, 5]. This often results in changing the production plan, belatedness in deliveries, customer loss etc.

Serious manufacturers bear such situations in mind as a possibility that "might" occur, but it should never be a rule. In contemporary economy the selection and assessment of suppliers are undertaken in order for their relations to be established at the level of partnership and mutual trust. There is a tendency to eliminate the intake control or at least reduce it to a minimum. Companies have no resources for the implementation of intake controls and they simply observe it as costs that are to be eliminated. It is possible by setting up a system of supplier selection and [1].

3. SELECTION AND EVALUATION OF SUPPLIERS

The selection of competent suppliers is a difficult task at setting up a new production line, especially when there is a large number of candidates. A good supplier may constitute a difference between success and failure, as well as lead to the increase in product production, by means of which an organization will realize a large profit. The first step in the selection of a supplier is defining goods that are to be purchased, in the form of a written specification or a detailed plan. All potential

suppliers must know how to produce the goods (product) and meet other requirements such as deadlines and price. It is very important that in this phase the organization has an idea of the planned purchase scope during the first year and in the next three to five years. With this basic information potential suppliers may be considered and assessed by drawing a comparison between them.

One of the options is to select a supplier due to their geographical vicinity and the possibility that they become involved in the product development. In these and similar cases it is not profitable to carry out assessment procedures. However, in finding a long-term supplier for goods that is ordered in large amounts, it is profitable to spend time in the early phase of development regarding the selection of the best supplier.

Today it is simple to access information on potential suppliers. In most cases there is a long list of possible suppliers for concrete goods. This list has to be reduced to ten or less names. It is advisable to check their financial business activities. Today it is possible to delegate such tasks to professional organizations.

After the financial check-up the list of potential suppliers mostly comes down to 3-5 organizations. The representatives of the manufacturer should visit potential suppliers and make a detailed analysis of all of them. Some information may be obtained even before the visit by sending suitable questionnaires. However, it should be considered that there is no alternative to personal presence and monitoring suppliers' work at their organization. A visit helps in the assessment, but even more, it initiates the communication with suppliers.

During the suppliers' assessment at their organization the following questions are to be asked: to what extent do the objectives and quality programs comply with the customer's needs, to what extent do processes and procedures within the quality assurance program comply with their objectives. The assessment objective is to create a judgment on the successfulness of the supplier's program, and not labeling the efficiency or observing their downsides [2,8].

The research conducted by the author on a representative sample amounting to 127 manufacturing companies in the Istarska County and Primorsko-goranska County show that four areas are most frequently assessed in suppliers (Figure 1):

1. quality
2. price
3. delivery deadlines
4. efficiency

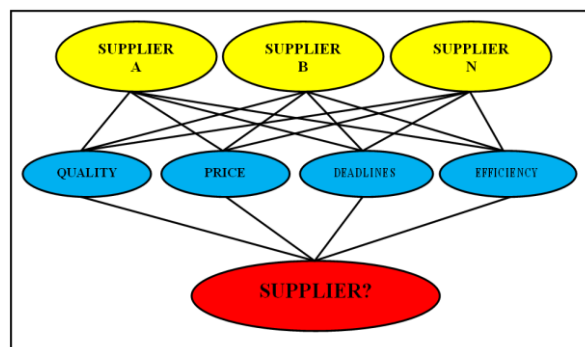


Figure 1. Criteria for defining the supplier

Based on the conducted factor analysis of impact factors related to the selection of the supplier and them being a priori ranked, weighting factors for the four impact factors were obtained [7] (Table 1).

Table 1. Supplier assessment

Factor	Weighting factor
1. Quality	0,043
2. Price	0,029
3. Delivery deadlines	0,021
4. Efficiency	0,017

3.1. Supplier assessment method - QPDE

The method (QPDE; **Q**uality, **P**rice, **D**elivery deadlines, **E**fficiency) was developed based on the aforementioned criteria. Each criterion has its standards. Quality could be analyzed in all areas, but it prevails in the first five items (Table 2). Quality constitutes 40%-60% of the overall grade.

Table 2 shows the supplier assessment form based on the four aforementioned criteria. If an organization had already done business with potential suppliers, items such as "data on deliveries" can be defined very precisely without a visit to the supplier. Other items may be difficult to define even during a visit, but a well-prepared supplier will be ready to explain their system to a potential customer.

Grades between 0 and 5 are applied to each standard, which allows for the implementation of a quantified procedure of comparing each supplier. The basic scale of the grade is:

- 0-negative
- 1-very bad
- 2-bad
- 3-average
- 4-good
- 5-very good

If the evaluator possesses no information, they give the grade "3", by means of which they do not accept nor rejects the supplier. Table 3 contains a more detailed explanation of individual grades and standards.

Table 2. Supplier assessment

Supplier			
Address			
CRITERIA AND STANDARD	Grade	Note	
I QUALITY			
▪ A Quality control employees			
▪ B Quality control procedures			
▪ C Quality awareness			
▪ D Previous experience			
II PRICE			
▪ A Price-quality relation			
▪ B Price stability			
▪ C Relation to others			
III DELIVERY DEADLINES			
▪ A Production capacity			
▪ B Suitable delivery deadlines			
IV EFFICIENCY			
▪ A Contemporary technical logistics			
▪ B Operative efficiency			
▪ C Certificates			

The best way of implementing the assessment is team work, bearing in mind the team's composition. The team has to be composed of experienced workers from the production, quality control, laboratory, purchasing department and warehouse.

Table 4 shows an example of a good grade given to a supplier. There are small differences between grades given by the laboratory, production and quality control. The production assessed the supplier with lower grades in the technical area of delivery, mostly due to insufficient knowledge about the area. The better the evaluators are informed about these items, the smaller are the differences in grades.

It can easily be noticed that a supplier whose grade is lower than 3 will have a lot to do. If the visit to potential suppliers is well-done, there will be a small amount of grades ranging between 0 and 2. By analyzing suppliers anticipated as possible, it can easily be calculated which ones have the best values.

It is important to point to the fact that the supplier analysis is analog to the loss and gain image. It points to the state at a single moment, but does not guarantee that it will be the same at any moment. The communication established during the supplier assessment must be continued in order for good partnership and business relations to last long and be improved continually.

Table 3. Detailed indicators in supplier assessment

CRITERION	grade
I. QUALITY	
A. Quality control employees	
<i>Very good</i> – the supplier has enough capable employees in the quality control	5
<i>Good</i> – the supplier has an almost filled in employee systematization in the quality control	4
<i>Average</i> – the supplier has average (the same number of competent and less competent) employees in the quality control	3
<i>Bad</i> – the supplier has a small number of employees who work in the quality control	2
<i>Very bad</i> – the supplier has no employees working in the quality control	1
B. Quality control procedures	
<i>Very good</i> – there is a quality assurance manual and quality procedures in the complete quality management system	5
<i>Good</i> – there are written procedures for controlling the purchased material in the purchasing process	4
<i>Average</i> – there are only written procedures for controlling the quality in the production process	3
<i>Bad</i> – there are some work instructions for specific operations and tasks	2
<i>Very bad</i> – there is no manual, procedure and work instructions	1
C. Quality awareness	
<i>Very good</i> – quality is taken care of in all phases and at all levels	5
<i>Good</i> – quality is taken care of only regarding production material, in the production process and in the final product phase	4
<i>Average</i> – production materials and final products quality is taken care of	3
<i>Bad</i> – either production materials, process or final products quality is taken care of	2
<i>Very bad</i> – quality control is not taken care of and the need for it does not exist	1
D. Previous experience	
<i>Very good</i> – deviation from the specifications in the previous year amounts to 0-5%	5
<i>Good</i> – deviation from the specifications in the previous year amounts to 6-10%	4
<i>Average</i> – deviation from the specifications in the previous year amounts to 11-15%	3
<i>Bad</i> – deviation from the specifications in the previous year amounts to 16-20%	2
<i>Very bad</i> – deviation from the specifications in the previous year amounts to 21% and more	1
II. PRICE	
A. Price-quality relation	
<i>Very good</i> – the price-quality relation is very favorable – above	5

expectations	
Good – the price-quality relation is expected	4
Average – the price-quality relation is below expectations	3
Bad – the price-quality relation is significantly below expectations	2
Very bad – the price-quality relation is troublesome	1
B. Price stability	
Very good – the supplier always sticks to the arranged price	5
Good – they rarely request a change in price	4
Average – they sometimes requests a change in price	3
Bad – they usually “bargain”	2
Very bad – they never stick to the arranged price	1
C. Relation to others	
Very good – the price is below the price of competitors/similar products	5
Good – the price is below the price of most of competitors	4
Average – the price is averagely the same as the one of most of competitors	3
Bad – the price is above the price of most of competitors	2
Very bad – price / similar quality	1
III. DELIVERY DEADLINES	
A. Production capacity	
Very good – there are backup production capacities	5
Good – there is a capacity alternative in the case of disturbances and damage on own capacities	4
Average – capacities meet the requirements	3
Bad – capacities meet most of requirements	2
Very bad – capacities cannot meet the requirements	1
B. Suitable delivery deadlines	
Very good – always earlier than the arranged deadline, there is the possibility for following the JIT principle	5
Good – mostly on time	4
Average – usually on time/no data	3
Bad – rarely on time	2
Very bad – always late	1
IV. EFFICIENCY	
A. Contemporary technical logistics	
Very good – the supplier possesses a contemporary technological park and other resources necessary for achieving business excellence and follows global trends in their area	5
Good – the supplier possesses contemporary technology and other support for achieving good results and is on their way to achieving better results	4
Average – the supplier possesses conventional technical and other support as most of suppliers	3
Bad – the supplier possesses old-fashioned technical and other support and it is difficult to expect that they can keep the continuity of quality and delivery deadlines	2
Very bad – there is no contemporary technical or other logistic support for achieving the required or arranged quality and they do not follow global trends in their area at all	1
B. Operative efficiency	
Very good – the supplier achieves excellent results on the market	5
Good – the supplier performs their business activities just above the profitability level	4
Average – the supplier is capable of profitable business activities / no data	3
Bad – the supplier performs their business activities below the profitability level	2
Very bad – the supplier has financial losses	1
C. Certificates	
Very good – the supplier possesses quality system certificates and certificates proving the quality of their products, as well as other certificates (environment, safety, socially responsible business activities, information protection etc.)	5
Good – the supplier possesses quality system certificates and certificates proving the quality of their products	4
Average – the supplier possesses quality system certificates	3
Bad – the supplier does not possess quality management certificates, but a quality management system can be recognized	2
Very bad – the supplier possesses no certificates and has no recognizable quality management system	1

Table 4. An example of assessing a supplier

Supplier:		Type of goods:					
		Date of assessment					
C R I T E R I O N	S T A N D A R D S	G R A D E S					
		0	1	2	3	4	5
	A. Quality control employees					Q. M	L
	B. Quality control procedures					Q. M. L	

I	C. Quality awareness						Q. M. L
	D. Previous experience					Q. M. L	
II	A. Price-quality relation					Q. M. L	
	B. Price stability					M	Q
	C. Relation to others					M	Q L
III	A. Production capacity					M	Q L
	B. Suitable delivery deadlines					M	Q. L
IV	A. Contemporary technical logistics						M Q. L
	B. Operative efficiency						Q. M. L
	C. Certificates						Q. M. L
Total number of points:		I	II	III	IV	Average grade	4.14
Q-quality control		16	12	8	15	Status of the supplier: A-4.50÷5.00 B-4.20-4.49 C-3.80-4.19	A
M-production		16	10	6	14		B
L-laboratory		17	11	9	15		C
Average grade		4.0 8	3.6 6	3.8 3	4.8 8		
Supplier assessment committee						Signature	
Q		Milanka Radojčić					
M		Stjepan Kelava					
L		Katarina Opačić Mandulić					

4. CONCLUSION

The selection of a supplier begins with the decision whether or not to make or to purchase. This decision requires a factor analysis such as knowledge and necessary devices, plant capacities, ability to meet delivery deadlines, expected costs of “making” or “purchasing” and other issues. At making the decision on purchasing the number of suppliers for each item is to be decided on [2].

It is important to notice that more supply sources have advantages for customers that mostly reflect in:

- lower costs
- better supply
- minimal supply stopping
- better quality of purchased goods.

Opposed to a larger number of suppliers it should be borne in mind that contemporary manufacturers demonstrate the trend of constant reduction in the number of suppliers. Literature sources [2] mention that around the year of 1980 the supplier base was reduced from 50 % to 70 %. Communication with a smaller number of suppliers is easier and there is more time for cooperation. This still does not mean that only one supplier should exist in all purchasing processes.

Regardless of the number of suppliers, the selection should be based on the reputation of suppliers, qualification examinations and product control. The foundation for this should be reliable and timely information and data on suppliers.

At selecting suppliers the ones should be preferred who will guarantee for service or product quality, who will deliver goods on time, who will ensure maintenance, support and who will know and understand the business activities for the purpose of which the product, i.e. the service is supplied [8].

In everyday business activities it is often necessary to select the best among several equal or similar options. Very often the first, and frequently the only criterion has been the price of the service or product. Today competition is very strong and prices are not the only and the main criterion. For continual business activities it is very important to have reliable suppliers with whom continual cooperation is arranged. One supplier is better according to one, and the other according to some other criterion. How to select the best one? From several tens of criteria four were chosen in this example. A possible method was presented, which showed results in real economy. Each organization should develop a suitable way for selecting and monitoring their suppliers, using contemporary statistical tools and methodologies. This particularly refers to the usage of histograms, lot-plot plan, pareto analysis, cause and consequence diagram, as well as other methods that can be found in various norms or are mentioned in regulations.

Based on the presented facts about suppliers, the following may be concluded:

- A verified supplier is the one for whom it is determined, after a comprehensive analysis, that they supply goods of such quality that it is not necessary to carry out a routine inspection of each received delivery.
- Partnership with suppliers requires common economical planning, common technological planning and cooperation during the contract execution.
- By assessing and verifying suppliers an organization significantly reduces the number of suppliers and creates preconditions for reducing non-quality costs.
- The foundation for supplier assessment refers to quality specifications that an organization must develop, an elaborated methodology with known criteria and standards that shall be known to future suppliers.

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